1756HP-HTB-M

USER MANUAL

Rev 1.5 – Sept 2005

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CHAPTER 1 INTRODUCTION

Hiprom presents the 1756HP-HTB-M Hitachi interface module. The 1756HP-HTB-M and the 1756HP-HTB-S [1] modules together provide an interface between existing Hitachi control systems and new Allen Bradley ControlLogix PLC's. The 1756HP-HTB-M (master) module is able to interrogate the remote I/O, emulating the control of the Hitachi I/O master module, be that either via a CE module or from the H02 CPU directly. Reference can be made to Appendix A which details the HISEC IO network.

The module fits directly into any single slot within a ControlLogix System and is configured in RSLogix5000 using the Generic Profile. A Brad Harrison Nano-Change (M8) Receptacle provides a physical connection for the Hitachi signaling.

This document serves to describe the functionality, installation, configuration and use of the module.

[1] *Reference can be made to the 1756HP-HTB-S User Manual for detailed information regarding this manual*

CHAPTER 2 MODULE ACCESSORIES

Each 1756HP-HTB-M package includes the following components:

- **1756HP-HTB-M module**
- **2m patch lead**

CHAPTER 3 MODULE OPERATION

The 1756HP-HTB-M module is designed to operate within the Allen-Bradley ControlLogix PLC system. All power required for the module's operation is derived from the 1756 backplane.

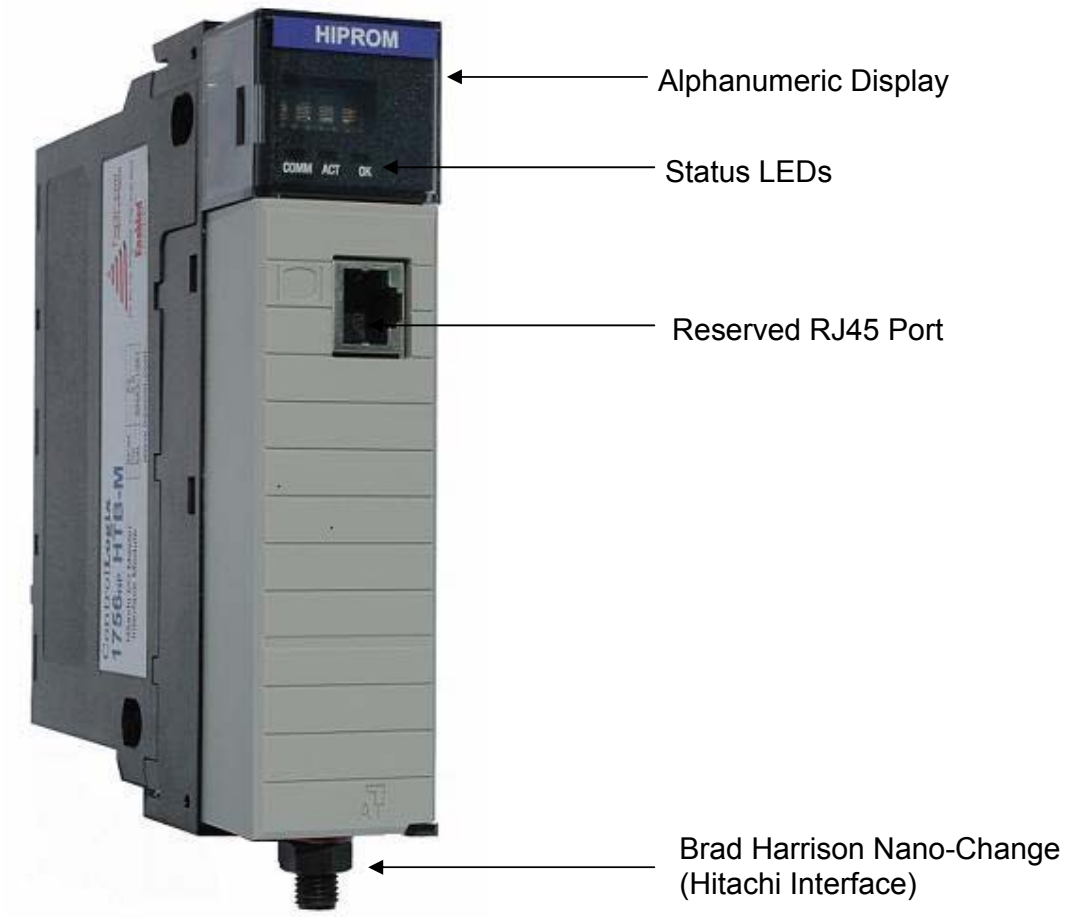


Figure 3.1 : 1756HP-HTB-M Layout

The current status of the module is conveyed to the user by means of the 3 bi-color Status LED's and the alphanumeric LED display. Appendix B details the various states of the LED's and messages of alphanumeric display.

The following information is available to the user directly across the backplane by means of a scheduled connection:

- Hitachi I/O data (for a slot configured as an input module)
- Hitachi slot status information.

The Brad Harrison Nano-Change Receptacle located on the bottom of the module provides an external connection for the Hitachi interface. The board is supplied with the respective 2m five core patch cable, of which the Hitachi cables are white and black.

CHAPTER 4 INSTALLING THE MODULE

The module is equipped with RIUP (Removal and Insertion Under Power) circuitry enabling the module to be installed or removed from the chassis while power is applied.

CHAPTER 5 CONFIGURING THE MODULE

A direct connection between the controller and the 1756HP-HTB-M module is required to transfer I/O data to and from the module.

5.1. Establishing the Direct Connection

This section describes the procedures necessary to configure the 1756HP-HTB-M module within the ControlLogix system. Each 1756HP-HTB-M module must be owned by a single ControlLogix controller.

The 1756 Generic Module is used in RSLogix5000 to configure the module. The configuration of the module is detailed in the table below.

Data Format			
CommFormat	Data – DINT		
Connection parameters			
Description	Instance	Size	
Input	1	32(32 Bit)	
Output	2	32 (32 Bit)	
Configuration	4	12 (8 Bit)	
RPI			
Min	5 msec	Max	750.0 msec

Table 5.1 : 1756HP-HTB-M connection parameters.

The steps required to add a new 1756HP-HTB-M module are detailed below.

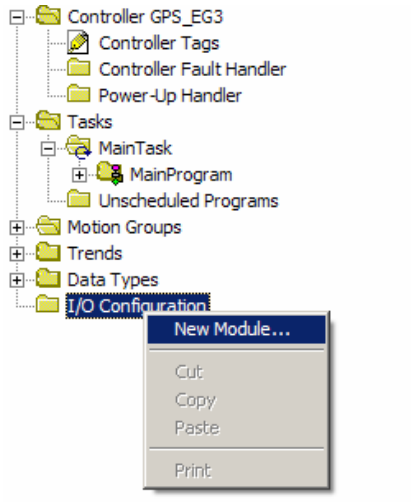


Figure 5.1 : Right-click on I/O Configuration and select New Module

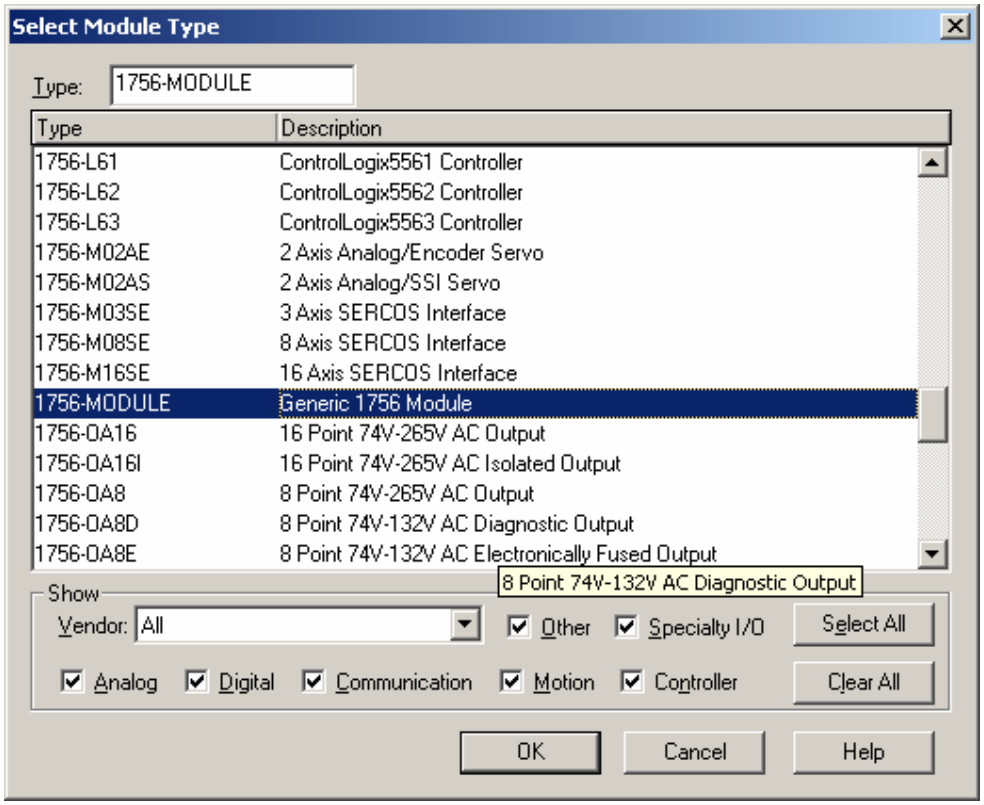


Figure 5.2: Select Generic 1756 Module (1756-MODULE)

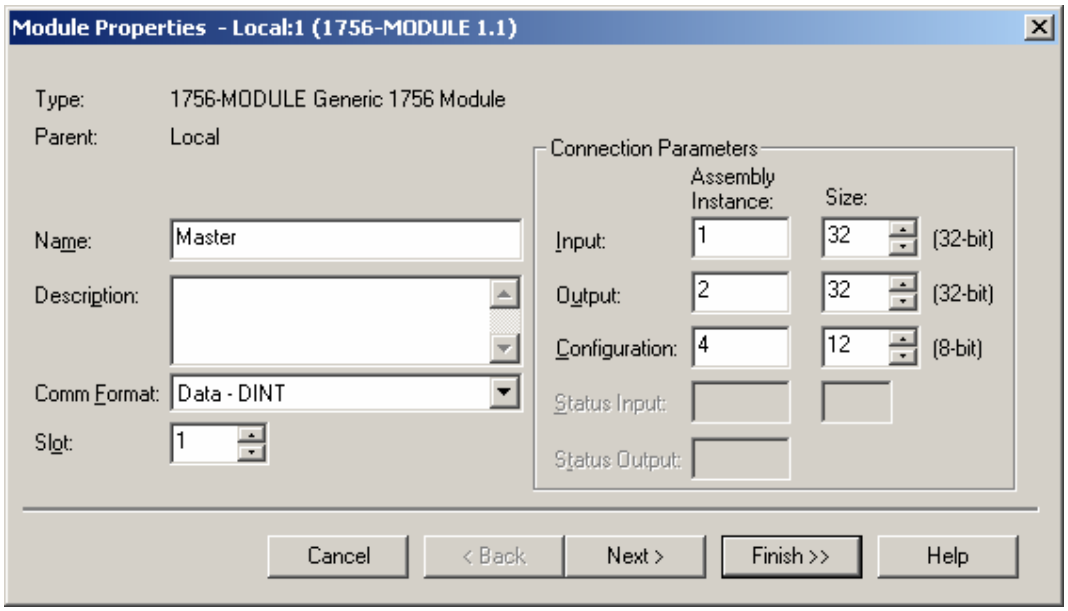


Figure 5.3: Configure module's parameters

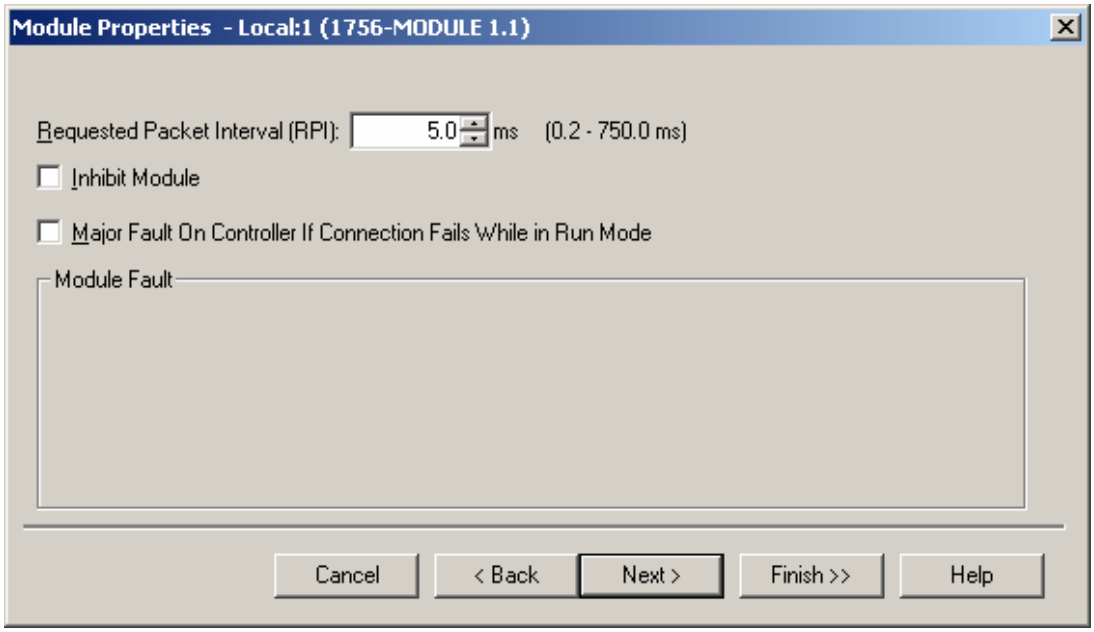


Figure 5.4: Configure module's RPI (Requested Packet Interval)

Before a connection is established between the 1756HP-HTB-M module and a ControlLogix processor, the Configuration data must be setup. The configuration data specifies the

- Enabled Hitachi I/O slots and direction as either an output or input
- Low, medium and high percentage diagnostic thresholds.

The format of the configuration data is illustrated below.

BIT	7	6	5	4	3	2	1	0
BYTE								
	I/0 Enable							
0	S7E	S6E	S5E	S4E	S3E	S2E	S1E	S0E
1	S15E	S14E	S13E	S12E	S11E	S10E	S9E	S8E
2	S23E	S22E	S21E	S20E	S19E	S18E	S17E	S16E
3	S31E	S30E	S29E	S28E	S27E	S26E	S25E	S24E
	Input / Output							
4	IO7	IO6	IO5	IO4	IO3	IO2	IO1	IO0
5	IO15	IO14	IO13	IO12	IO11	IO10	IO9	IO8
6	IO23	IO22	IO21	IO20	IO19	IO18	IO17	IO16
7	IO31	IO30	IO29	IO28	IO27	IO26	IO25	IO24
	Diagnostic Threshold levels							
8	Low Threshold							
9	Medium Threshold							
10	High Threshold							
11	Reserved							

The first four bytes (S**n**E where n = Extended Slot number) of the Configuration Image indicate the Hitachi enabled slots.
“1” = Enabled,
“0” = Disabled

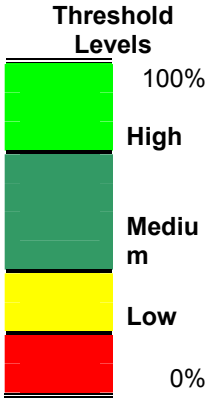
The next four bytes (IO**n** where n = Extended Slot number) of the Configuration Image specify whether the enabled slots are either of type Input or Output:

“1” = Output
“0” = Input

Warning:
It is important to ensure that the module is correctly configured. Configuring an Hitachi Output module as an Input module could result in all the outputs of that module being switched on. This could result in possible equipment damage or personal injury

Note: The 1756HP-HTB-M can only support 30 slots (i.e 0..29)

The remaining fields to be configured are those of the threshold levels. The module continuously records an accurate successful percentage rate for each enabled slot within a one second time frame. The thresholds levels that are specified within the configuration file create ranges as illustrated below that are then used for diagnostic display purposes (refer to Appendix B).



Once a module’s configuration data has been loaded correctly to the controller, a connection between the controller and the 1756HP-HTB-M may be established. Should

the configuration of the 1756HP-HTB-M change, the module will need to be reset. A connection will fail if there is inappropriate configuration data, this includes:

- The specified size of the Input, Output, or Configuration size is incorrect
- The assembly instance of the input, Output and Configuration is incorrect
- An RPI that does not fall within the specified range

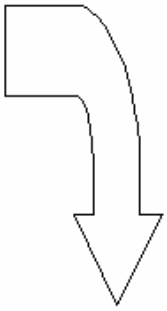
The module utilizes a system watchdog to ensure the integrity of the connection to the controller, refer to the Output Image.

CHAPTER 6 I/O ADDRESS MAP

The input and output image of the 1756HP-HTB-M module is defined in the following sections.

6.1. Input Image

WORD	DESCRIPTION
0	Slot 0 Input and status data
1	Slot 1 Input and status data
2	Slot 2 Input and status data
3	Slot 3 Input and status data
4	Slot 4 Input and status data
5	Slot 5 Input and status data
6	Slot 6 Input and status data
..	
27	Slot 27 Input and status data
28	Slot 28 Input and status data
29	Slot 29 Input and status data



BIT	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DESCRIPTION	Reserved										Timeout	Mismatch	Checksum	Status	Direction	Enabled	Input Data															

Figure 6.1 : Connected Input Image

6.2. Input Image Description

Field/Value	Description	Location	Type
Data	**Input Data** **If module is configured as an input this field reflects the current data of the associated input Hitachi slot. If the associated Hitachi slot is configured as an output, the data will display 0x0000**	**Local:s:I.Data[n].0..15**	INT
Enabled	**Slot Enable** 0 = Hitachi Slot not enabled 1 = Hitachi Slot is enabled	**Local:s:I.Data[n].16**	BIT
Direction	**Slot type: Indicates the direction / type of module located in the associated slot** 0 = Input module 1 = Output module	**Local:s:I.Data[n].17**	BIT
Status	**Module status: Should the module in the associated slot be enabled this bit indicates the current status of that module** 1 = Associated slot is operating correctly 0 = Associated slot has faulted. One can refer to the Timeout, Mismatch, and Checksum bits for further details.	**Local:s:I.Data[n].18**	BIT

Checksum	**Checksum bit: Indicates that the checksum of the received data did not match** 1 = No fault with received data 0 = Checksum of the received data of the associated slot was incorrect	**Local:s:I.Data[n].19**	BIT
Mismatch	**Address Mismatch: Indicates that the associated slot responded with an address that did not match that of the request.** 1 = No fault, correct address received 0 = An address mismatch occurred in the received data	**Local:s:I.Data[n].20**	BIT
Timeout	**Timeout bit: Indicates that a response was not received from the associated slot within a specific timeframe.** 1 = No fault, data received 0 = No response was received from the associated slot	**Local:s:I.Data[n].21**	BIT

Warning:
It is important to ensure that the diagnostic status information is used in the PLC logic in order to detect possible module or network failure. Failing to do so could result in possible equipment damage or personal injury

6.3. Output Image

Words 0..29

BIT	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
WORD																																		
0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																	Slot 0 Output Data
1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																	Slot 1 Output Data
2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																	Slot 2 Output Data
3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																	Slot 3 Output Data
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																	Slot 4 Output Data
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																	Slot 5 Output Data
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																	Slot 6 Output Data
..																X	X																	
20	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																	Slot 20 Output Data
21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																	Slot 21 Output Data
22	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																	Slot 22 Output Data

Should a slot be configured as a Hitachi output card, the Hitachi output card may be written to via the corresponding output image word. The data written to the card occupies the first 16 bits of the word. There will be no effect should a value be written to a word corresponding to an Input card. Thus, assuming slot 6 of the Hitachi network has been configured as a Hitachi output card, the data transmitted to the slot can be written to *Local:s:O.Data[6].*

Field	Description	Location	Type
Output Data	Data to be written to a Hitachi output card.	**Local:s:O.Data[n]0..15**	INT

Word 30
WatchDog

Word 30 (*Local:s:O.Data[30])* of the output image is reserved for a watchdog. The watchdog ensures that the connection with the controller has been established and continues to remain connected, thus ensuring that no inaccurate data can be written to the Hitachi network.

The watchdog is an integer (word) that must be changed within every 10mSec. Should the value not change the module will fault and this will be indicated via the alphanumeric display and LED statuses. Transactions with the Hitachi Network will terminate when the watchdog has faulted, and resume once the watchdog begins updating again.

APPENDIX A OVERVIEW OF HISEC IO NETWORK

Network Topology

The Hitachi HISEC I/O network is a single master, multiple slave network connected by means of a multi-dropped single pair of wires.

The master, typically an H02 CPU or a CE module connected to an H04 CPU, is responsible for interrogating (inputs) and commanding (outputs) on each logical slot on the network. Each slot is processed in logical slot ascending order although the protocol does not require this. That is, slot 0 is processed, then slot 1, and so on. After slot 31 has been processed it rolls over to slot 0 and the sequence is repeated.

The logical slot number (0-31), also referred to as the extended slot number, is the unique slot address on the network. For the first rack on the network, (station address zero), it is simply the physical slot number, numbering from 0 (on the left) to n-1 (on the right), where n is the number of logical slots in the physical rack. For subsequent racks, where the rack station address is greater than zero the extended slot number can be calculated as follows :

Extended Slot = (ST * 2) + y

Where :

ST = station address as configured by the ST dial on the rack controller (PST360) module, y = physical slot number (0 through n – 1, where n is the logical rack size)

The network does not differentiate on how the logical address is determined. For example, the modules in one 8 slot rack (with ST = 0), are addressed in the exact same manner in which two 4 slot racks (with ST = 0 and ST = 2 respectively) are addressed.

APPENDIX B MODULE STATUS

The following sections describe the status indicators of the module :

Status LEDs

LED	DESCRIPTION	STATUS	MEANING
OK	Module Status	Solid Red	Initialization or Watch Dog Fault
		Flashing Red	Major Fault
		Flashing Green	Minor Fault
		Green	Module operating correctly
ACT	Enabled Slots	Solid Red	Watchdog Error or No slots enabled
		Green	Slots Enabled

6.4. Status Display

Init	**Initialization of Module** The module is initialized only on power-up.
Frn	**Firmware Revision** The firmware revision number is displayed on power-up.
WDog	**WatchDog** Watchdog fault
Nn✓✓	Successful Transactions between High threshold and 100% (nn = Extended slot)
nn ✓	Successful Transactions between Medium and High threshold (nn = Extended slot)
nn X	Successful Transactions between Low and Medium threshold (nn = Extended slot)
nnXX	Successful Transactions between 0% and Low threshold (nn = Extended slot)

APPENDIX C RECOMMENDED DATA STRUCTURES

This Appendix provides a detailed description of recommended data structures that can be used.

Name	DataType	Style
EnableSlot	BOOL[32]	Decimal
TypeSlot	BOOL[32]	Decimal
ThresholdLow	SINT	Decimal
ThresholdMed	SINT	Decimal
ThresholdHigh	SINT	Decimal
Reserved2	SINT	Decimal

Table D.1: Master Module Configuration Data Structure

Name	DataType	Style
InputData	INT	Decimal
Enabled	BOOL	Decimal
Direction	BOOL	Decimal
Status	BOOL	Decimal
Checksum	BOOL	Decimal
Mismatch	BOOL	Decimal
Timeout	BOOL	Decimal
Reserved4	BOOL	Decimal
Reserved5	BOOL	Decimal
Reserved6	SINT	Decimal

Table D.2: Master Module Input Image Word Structure

Name	DataType	Style
Data	INT	Decimal
Reserved	INT	Decimal

Table D.3: Master Module Output Image Word Structure

APPENDIX D SPECIFICATIONS

Parameter	Specification
General	
Module Location	Any Slot
Electrical	
Backplane Current	515mA @ 5.1V
	3mA @ 24V
Schedules Connection Parameters	
RPI	5ms to 750ms